

I CLAIM:

1. A method of selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory module comprising a serial presence detect memory, said method comprising:
 - counting the number of said memory modules;
 - generating multiple clock frequencies to
 - 10 provide selectable operating speeds of said memory module interface; and
 - selecting one of said operating speeds of said memory module interface in accordance with said counting.
- 15 2. The method of claim 1 wherein said selecting comprises generating memory module interface signals comprising clock, address, and data signals at a frequency based on said memory module count.
3. The method of claim 1 further comprising
- 20 obtaining information from said serial presence detect memory that includes at least one characteristic of said memory module, wherein said selecting comprises selecting one of said operating speeds in accordance with one of said counting and said characteristic.
- 25 4. The method of claim 3 wherein said characteristic comprises the number of components in each said memory module.

5. The method of claim 3 wherein said characteristic comprises a speed grade of said memory module.

5 6. The method of claim 3 wherein said characteristic comprises a manufacturer of said memory module.

7. The method of claim 3 wherein said characteristic comprises a type of said memory module.

10 8. The method of claim 3 wherein said characteristic comprises a physical layout of signal connections between said memory controller and said memory module.

15 9. A method of selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory module comprising a serial presence detect memory, said method comprising:

20 counting the number of said memory modules;

obtaining information from said serial presence detect memory that includes at least one characteristic of said memory module; and

25 selecting said operating speed of said memory module interface in accordance with at least one of said counting and said obtaining information.

10. The method of claim 9 wherein said characteristic comprises a type of said memory module.

11. A method of selecting an operating speed
of a memory module interface in a computer system, said
system comprising a central processing unit, a memory
controller, and at least one memory module comprising a
5 serial presence detect memory, said method comprising:

counting the number of said memory
modules;

obtaining information from said serial
presence detect memory that includes at least the
10 number of components in each said memory module; and

selecting said operating speed of said
memory module interface in accordance with at least one
of said counting and said obtaining information.

12. A method of selecting an operating speed
15 of a memory module interface in a computer system, said
system comprising a central processing unit, a memory
controller, and at least one memory module comprising a
serial presence detect memory, said method comprising:

counting the number of said memory
20 modules;

obtaining information from said serial
presence detect memory that includes at least a speed
grade of said memory module; and

selecting said operating speed of said
25 memory module interface in accordance with at least one
of said counting and said obtaining information.

13. A computer system comprising:
a central processing unit;
a memory controller including a memory
30 module interface; and

at least one memory module including a serial presence detect memory; wherein said memory controller:

generates multiple clock frequencies;
5 accesses said serial presence detect memory;

keeps a running tally of the number of said memory modules based on said accesses to said serial presence detect memory; and

10 selects one of said clock frequencies for driving said memory module interface based on at least a final tally of the number of said memory modules.

14. The computer system of claim 13 wherein
15 said central processing unit is a microprocessor.

15. The computer system of claim 13 wherein said memory controller obtains information from said serial presence detect memory that includes at least one characteristic of each said memory module.

20 16. The computer system of claim 15 wherein said characteristic comprises the number of components in each said memory module.

17. The computer system of claim 15 wherein said characteristic comprises a speed grade of said
25 memory module.

18. The computer system of claim 15 wherein said characteristic comprises a manufacturer of said memory module.

19. The computer system of claim 15 wherein
5 said characteristic comprises a type of said memory module.

20. The computer system of claim 15 wherein said characteristic comprises a physical layout of signal connections between said memory controller and
10 said memory module.

21. A computer system comprising:
a central processing unit;
a memory controller including a memory module interface;
15 at least one memory module including a serial presence detect memory; wherein said memory controller:
accesses said serial presence detect memory;
20 keeps a running tally of the number of said memory modules based on said accesses to said serial presence detect memory;
obtains information from said serial presence detect memory that includes at least one
25 characteristic of said memory module; and
provides a memory module interface at a clock rate based on at least one of a final tally of the number of said memory modules and said obtained information.

22. The computer system of claim 21 wherein said characteristic comprises the number of components in each said memory module.

23. A computer system comprising:
5 a central processing unit;
a memory controller including a memory module interface;
at least one memory module including a serial presence detect memory; wherein said memory
10 controller:
accesses said serial presence detect memory;
keeps a running tally of the number of said memory modules based on said accesses to said
15 serial presence detect memory;
obtains information from said serial presence detect memory that includes at least the number of components in each memory module; and
provides a memory module interface at a
20 clock rate based on at least one of a final tally of the number of said memory modules and said obtained information.

24. A computer system comprising:
a central processing unit;
25 a memory controller including a memory module interface;
at least one memory module including a serial presence detect memory; wherein said memory controller:

accesses said serial presence detect
memory;

keeps a running tally of the number of
said memory modules based on said accesses to said
5 serial presence detect memory;

obtains information from said serial
presence detect memory that includes at least a speed
grade of said memory modules or their components; and

provides a memory module interface at a
10 clock rate based on at least one of a final tally of
the number of said memory modules and said obtained
information.

25. A computer system comprising:

a central processing unit;

15 at least one memory module including a
serial presence detect memory; and

memory controller means including
memory module interface means; wherein said memory
controller means:

20 generates multiple clock frequencies;
accesses serial presence detect memory;
keeps a running tally of the number of
said memory modules based on said accesses to said
serial presence detect memory; and

25 selects one of said clock frequencies
for driving said memory module interface means at a
clock rate based on at least a final tally of the
number of said memory modules.

30 26. A computer system comprising:

a central processing unit;

at least one memory module including a
serial presence detect memory; and

memory controller means including
memory module interface means; wherein said memory
5 controller means:

accesses serial presence detect memory;
keeps a running tally of the number of
said memory modules based on said accesses to said
serial presence detect memory;

10 obtains information from said serial
presence detect memory that includes at least one
characteristic of said memory module; and

provides a memory module interface means
at a clock rate based on at least one of a final tally
15 of the number of said memory modules and said obtained
information.

27. The computer system of claim 26 wherein
said characteristic comprises a type of said memory
module means.

20 28. The computer system of claim 26 wherein
said characteristic comprises a physical layout of
signal connections between said memory controller means
and said memory module means.

25 29. A computer system comprising:
a central processing unit;
at least one memory module including a
serial presence detect memory; and

memory controller means including
memory module interface means; wherein said memory
controller means:

accesses serial presence detect memory;

5 keeps a running tally of the number of
said memory modules based on said accesses to said
serial presence detect memory;

obtains information from said serial
presence detect memory that includes at least the
10 number of components in each memory module means; and

provides a memory module interface means
at a clock rate based on at least one of a final tally
of the number of said memory modules and said obtained
information.

15 30. A computer system comprising:

a central processing unit;

at least one memory module including a
serial presence detect memory; and

memory controller means including
20 memory module interface means; wherein said memory
controller means:

accesses serial presence detect memory;

keeps a running tally of the number of
said memory modules based on said accesses to said
25 serial presence detect memory;

obtains information from said serial
presence detect memory that includes at least a speed
grade of said memory module or its components; and

provides a memory module interface means
30 at a clock rate based on at least one of a final tally

of the number of said memory modules and said obtained information.

31. A memory controller comprising a memory module interface to at least one memory module, said
5 memory module including serial presence detect memory;
wherein said memory controller:

accesses serial presence detect memory;
keeps a running tally of the number of
said memory modules based on said accesses to said
10 serial presence detect memory; and

provides a memory module interface at a
clock rate based on at least at least a final tally of
the number of said memory modules.

32. The memory controller of claim 31
15 wherein said memory controller obtains information from
said serial presence detect memory that includes at
least one characteristic of said memory module wherein
said clock rate is also based on said characteristic.

33. The memory controller of claim 31
20 wherein said characteristic comprises the number of
components of said memory module.

34. The memory controller of claim 31
wherein said characteristic comprises a speed grade of
said memory module.

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35. The memory controller of claim 31
wherein said characteristic comprises a manufacturer of
said memory module.

36. The memory controller of claim 31
wherein said characteristic comprises a type of said
memory module.

37. The memory controller of claim 31
5 wherein said characteristic comprises a physical layout
of signal connections between said memory controller
and said memory module.

38. A memory controller comprising a memory
module interface to at least one memory module, said
10 memory module including serial presence detect memory;
wherein said memory controller:
generates multiple clock frequencies;
accesses serial presence detect memory;
keeps a running tally of the number of
15 said memory modules based on said accesses to said
serial presence detect memory;
obtains information from said serial
presence detect memory that includes at least one
characteristic of said memory module; and
20 selects one of said clock frequencies
for driving said memory module interface based on at
least one of a final tally of the number of said memory
modules and said obtained information.

39. The memory controller of claim 38
25 wherein said characteristic comprises a speed grade of
said memory module.

40. A memory controller comprising a memory
module interface to at least one memory module, said

memory module including serial presence detect memory;
wherein said memory controller:

accesses serial presence detect memory;
obtains information from said serial
5 presence detect memory that includes at least the
number of components in said memory module; and
provides a memory module interface at a
clock rate based on said obtained information.

10 41. A memory controller comprising a memory
module interface to at least one memory module, said
memory module including serial presence detect memory;
wherein said memory controller:

accesses serial presence detect memory;
15 generates multiple clock frequencies;
obtains information from said serial
presence detect memory; and
selects one of said clock frequencies
for driving said memory module interface based on said
20 obtained information.

42. The memory controller of claim 41
wherein said obtained information comprises a speed
grade of said memory module.

25 43. Apparatus for selecting an operating
speed of a memory module interface in a computer
system, said system comprising a central processing
unit, a memory controller, and at least one memory
module comprising a serial presence detect memory, said
30 apparatus comprising:

means for counting the number of said memory modules;

means for generating multiple clock frequencies to provide selectable operating speeds of
5 said memory interface; and

means for selecting one of said multiple clock frequencies to provide an operating speed in accordance with said counted memory modules.

44. The apparatus of claim 43 wherein said
10 selecting comprises means for generating memory module interface signals comprising clock, address, and data signals at a frequency based on said memory module count.

45. The apparatus of claim 43 further
15 comprising means for obtaining information from said serial presence detect memory, said information including at least one characteristic of said memory module; wherein said means for selecting selects one of said multiple clock frequencies in accordance with at
20 least one of said number of counted memory modules and said obtained information

46. The apparatus of claim 43 wherein said characteristic comprises the number of components in
25 each said memory module.

47. The apparatus of claim 43 wherein said characteristic comprises a speed grade of said memory module.

48. The apparatus of claim 43 wherein said characteristic comprises a manufacturer of said memory module.

49. The apparatus of claim 43 wherein said
5 characteristic comprises a type of said memory module.

50. The apparatus of claim 43 wherein said characteristic comprises a physical layout of signal connections between said memory controller and said memory module.

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51. Apparatus for selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory
15 module comprising a serial presence detect memory, said apparatus comprising:

means for counting the number of said memory modules;

means for obtaining information from
20 said serial presence detect memory that includes at least one characteristic of said memory module; and

means for selecting said operating speed of said memory module interface in accordance with at least one of said means for counting and obtaining
25 information.

52. Apparatus for selecting an operating speed of a memory module interface in a computer system, said system comprising a central processing unit, a memory controller, and at least one memory

module comprising a serial presence detect memory, said apparatus comprising:

means for counting the number of said memory modules;

5 means for obtaining information from said serial presence detect memory that includes at least the number of components in each said memory module; and

means for selecting said operating speed
10 of said memory module interface in accordance with at least one of said means for counting and obtaining information.

53. Apparatus for selecting an operating speed of a memory module interface in a computer
15 system, said system comprising a central processing unit, and a memory controller, and at least one memory module comprising a serial presence detect memory, said apparatus comprising:

means for counting the number of said
20 memory modules;

means for obtaining information from said serial presence detect memory that includes at least a speed grade of said memory module; and

means for selecting said operating speed
25 of said memory module interface in accordance with at least one of said means for counting and obtaining information.